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PROCESSING FOR SONIC WAVEFORMS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a divisional of pending U. S. Application Serial No. 10/243,471 filed September 13, 2002, ^{now U.S. Patent 6,691,036,} which is a continuation of U.S. Application Serial No. 09/547,304 filed April 11, 2000, now U.S. Patent 6,453,240, and further relates to and claims the benefit of U.S. Provisional Application Serial No. 60/128,912 filed April 12, 1999.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable.

BACKGROUND OF THE INVENTION

[0003] To determine whether a particular rock formation contains oil or other hydrocarbons, it must have certain properties. Acoustic tools, also known as sonic tools, are one way to investigate a rock formation around a wellbore.

[0004] As shown in Figure 1, an acoustic tool 100 may be part of a bottomhole assembly in a drill string 110 drilling through a rock formation 120. Alternately, such an acoustic tool may be part of a wireline device. The acoustic tool may include an acoustic transmitter 130 and a set of acoustic receivers 140, 145. When the acoustic tool is placed in the wellbore drilled through a rock formation, the tool 100 transmits a signal 150 from its transmitter 130. This signal travels through the rock formation 120 and arrives at the receivers 140, 145. The signal is detected at the set of receivers as a series of waveforms 155 as generally shown in Figure 2A. One parameter of particular interest is an acoustic signal's speed through the surrounding formation. Speed can also be expressed as slowness, the inverse of speed. Such information is then used to infer whether